

ELEMENTARY MATHEMATICS CURRICULUM: STATE POLICY, COVID-19, AND TEACHERS' CONTROL

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In the U.S., state guidance to schools in response to the COVID-19 pandemic was politicized. We used state-level political affiliation to explore whether access to curricular resources differed pre-pandemic or during pandemic remote teaching and teachers' reported control over curricular resources during pandemic teaching. We found that pre-pandemic the percentage of teachers in Republican states reported higher levels of resources overall, and use of core and teacher-created curricular resources in particular. They also reported having greater control over their curricular decision-making during the pandemic. There were no state-level differences in teachers' level of preparation for pandemic teaching, but teachers in Democrat states reported a greater proportion of their students had sufficient resources for online learning. We discuss the implications of these findings in terms of teacher control and state policies.

Keywords: Policy, Curriculum, Elementary School Education

Purpose of the Study

The purpose of this study was to report the curriculum resources used by elementary mathematics teachers before and during the COVID-19 pandemic as well as perceived teacher control related to making several curricular decisions with the onset of remote learning in March 2020. The following research questions guided this study:

1. Pre-pandemic, were there Republican and Democrat state-level differences in elementary mathematics teachers' reported use of core, supplemental, and teacher-created curricular resources, or in the overall number of resources teachers used?
2. During pandemic remote teaching, were there Republican and Democrat state-level differences in elementary mathematics teachers' reported use of core, supplemental, and teacher-created curricular resources, or in the overall number of resources teachers used?
3. During pandemic remote teaching, were there Republican and Democrat state-level differences in elementary mathematics teachers' reported level of control over their curricular decision making, preparation to engage in remote teaching, or students' access to sufficient technological resources to engage in remote teaching?

Theoretical Perspectives

We use Wahlström's (2023) following conceptualization of curriculum: "Curriculum is not only a stable body of knowledge in accordance with a discipline. It is also about meaning making and negotiation among different actors in society and the education system, as politicians, national education authorities, teachers, etc." (pp. 260-261). Thus, how teachers interact with and implement curriculum is influenced by the context specific events (Doyle, 1992). In our study, we investigated how, if at all, the teachers' curricular decision-making processes differed by state policy.

Politics of Curriculum: Teacher Control

In the U.S., there is historical precedent for the impact of politics on curricular resources and how stakeholders make decisions about those resources. For example, the practice of textbook adoption refers to the use of state funds to purchase selected textbooks for use by teachers in a given state whereas local funds may be needed to purchase textbooks and curricular resources not adopted by the state as a whole (Silver, 2021). Teachers often rely heavily on a core curriculum resource or textbook to select and implement content and instructional strategies; and thus, selecting textbooks from the abundance of available textbooks in the market becomes a political decision (Polikoff et al., 2020). Moreover, states often follow different procedures to adopt textbooks. For example, some states allow teachers to make suggestions on which textbooks they want to use while other states include parents and school boards on the textbook adoption committees. The degree to which materials purchased with state and local funds are mandated for use by teachers may also be politicized (Cohen & Ball, 1990) as can the degree to which state tests and teacher evaluation metrics are aligned with materials adopted by the state (Mathison & Freeman, 2003). Thus, how textbooks are selected, adopted, mandated, and evaluated at the state level has a direct impact on how much control teachers have over the implementation of their curricular resources. It is therefore important to consider external and sometimes political factors in addition to the many internal factors that influence teachers' perceived control of curriculum (Emirbayer, 1992).

Teacher's control of the curriculum is one aspect of teacher autonomy. Autonomy may be defined as having two components, (a) general autonomy, including classroom standards of conduct, and (b) curricular autonomy, including selecting curricular materials (Pearson & Hall, 1993). In this study, we focused on teacher curricular control, specifically the independent decisions teachers needed to make on selecting and using curricular resources and the degree to which teachers felt empowered to make curricular decisions in a way that benefits students (Dampson et al., 2019).

Politics of Curriculum: The Context of COVID-19

The need to shift to remote learning in the U.S. during the novel coronavirus (COVID-19) pandemic introduced a new and complex situation for K-12 teachers as they had to adjust many aspects of their curricular decisions. While all 50 states announced the closure of schools in March 2020, there was significant variation in terms of the guidelines for remote teaching and the resources teachers were provided with when schools were closed (Reich et al., 2020). For example, some states (e.g., Massachusetts, Illinois, and Kansas) published lists of resources, websites, and subscription applications to facilitate teachers' need to address learning needs across grade levels and content areas as soon as schools were closed while others left teachers with both more freedom and less scaffolding for the unique teaching context of the pandemic. As the pandemic continued past the first few weeks of closure, states and districts continued to develop policies related to levels and types of controls on remote teaching and to the return to in-person instruction. In order to adapt to shifting state policies and evolving understandings of the pandemic, teachers needed to be responsive in their decision-making (Baniahmadi et al., 2021). While we recognize that every state instituted different policies and procedures during the pandemic, historically those decisions have been influenced by state policies (Placier et al., 2002). Additionally, evidence suggests the pandemic response in the U.S. was highly politicized with Republican policymakers more likely to endorse a swift return to "normal" while Democrat policymakers were more likely to endorse mask wearing and social distancing mandates (Grossmann et al., 2021). In this study, we explore the curricular resources used by teachers in

Republican and Democrat states prior to the COVID-19 pandemic and whether those curricular resources changed during the pandemic remote teaching.

Teacher Control During the COVID-19 Pandemic

Teachers all over the globe faced unique opportunities and challenges during the COVID-19 pandemic. The transition to remote learning increased variability in terms of class locations, class times, types of curricula to be selected for students, course content to cover, instructional approaches, learning resources and location, technology use, the requirements for entry/completion dates, and communication medium (Huang et al., 2020). Such variability suggests that teachers may have had the potential to experience more control in terms of curricular use during remote teaching. However, when teachers have more control over curricular choices, they face several challenges in terms of curricular decisions. For example, teachers often struggle to select curricular resources that are appropriate to achieve the assessment requirements while also addressing students' needs (Ormond, 2017), and these effects were likely magnified during the pandemic when student needs and access to resources varied across households (Baniahmadi et al., 2021). Additionally, how teachers use and perceive their control is influenced to some extent by teacher characteristics such as gender, age, teaching experiences, and contextual factors (Dampson et al., 2019).

The COVID-19 pandemic also changed how curriculum was implemented and evaluated. During the transition from face-to-face to remote modalities, many teachers, administrators, and policymakers attempted to create appropriate and equitable learning environments for all learners (Aguliera & Nightengale-Lee, 2020; Huck & Zhang, 2021). Schools, especially those with fewer resources, were challenged to provide access to functioning technology and even to develop materials that were easily accessible to students who had limited access to technology (Doherty et al., 2022; Gross & Opalka, 2020). Teachers needed to use new teaching models that met requirements imposed by schools under the guidance of district and state policymakers while also exploring new online teaching resources. Teachers also needed to consider the resources that students have access to as well as other adjustments as they switched teaching modalities (Aguliera & Nightengale-Lee, 2020). During this period, teachers had to make many curricular decisions to optimize educational resources and promote educational equity (Zhou, 2020).

Methods

Teachers

This study is part of a larger project, *Project C3T2*. The primary aim of the project is to understand and support the curricular decisions that teachers need to make in diverse curricular contexts to provide a coherent sequence of activities while being responsive to the needs of their students. The project was conceptualized prior to COVID-19 and was thus positioned to explore curriculum as schools shifted in relation to the pandemic. The data presented here are drawn from a survey administered in September 2020 to 524 third, fourth, and fifth-grade teachers from 46 states. The majority of the teachers taught in public schools (90%) located in suburban (55%), urban (28%), and rural districts (17%).

Survey

Teachers were asked about their use of mathematics curricular resources in Spring 2020 prior to emergency closures of schools and during the pandemic remote instruction. For example, we asked the teachers why they started or stopped using a certain type of mathematics curricular resources when they moved to remote teaching. They were also asked about their level of control

over the usage of their curricular resources and about supports and barriers they experienced to successful remote teaching.

State Politics

We identified the 46 states represented in the data set as Republican, Democratic, and mixed based on how the state voted in the 2016 and 2020 presidential elections. That is, a state that voted for Former Secretary of State Clinton in 2016 and President Biden in 2020 was coded as Democrat, and a state that voted for President Trump in 2016 and 2020 was coded as Republican. States that voted Democrat in one election and Republican in the other were coded as mixed/purple. The analysis presented here focuses on Republican and Democrat states. See Table 1 for state politics coding.

Table 1: State Politics Coding

Politics	States
Democrat	California, Connecticut, Delaware, Hawaii, Illinois, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, Vermont, Virginia, Washington, and the District of Columbia.
Republican	Alabama, Arizona, Alaska, Arkansas, Florida, Idaho, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Montana, Nebraska, North Carolina, North Dakota, Ohio, Oklahoma, South Dakota, South Carolina, Tennessee, Texas, Utah and Wyoming.

Defining Curricular Resources and Their Types

Curricular resources were defined as including any curricular materials used by teachers for the purposes of planning, teaching, and/or assessment, such as (a) packaged curriculum; (b) individual lesson plans, activities, and materials; and (c) electronic and online resources and apps. In this study, examples were provided to teachers, including textbooks and teacher guides purchased by schools and districts (such as Everyday Mathematics or Houghton Mifflin Math), online curricula (such as EngageNY), online resources (such as IXL, Zearn, or BrainPop), materials downloaded from websites (such as TeachersPayTeachers or Pinterest), or materials teachers create for themselves. We categorized these resources into three categories, depending on how those resources are created and the purpose of the curricular resources, (a) core, (b) supplemental, and (c) teacher created. We categorized a curricular resource as a core resource if it addresses all or nearly all of the given standards for the grade level. Supplemental curricular resources were identified as those used as secondary resources along with the core curriculum. The goal of supplemental curricular resources was to extend activities from core curricular resources in order to meet the needs of individual learners, provide practice opportunities, and make the classroom more engaging. Thus, supplementary curricular resources might align with a subset of standards. Teachers-created curricular resources are the ones created by the teachers and shared with their colleagues personally or through online repositories. These resources are also used to extend the core curricular resources.

Analysis

Independent t-tests were used to compare Republican and Democrat states to answer the research questions. Data reflect two time points: Spring 2020 before the pandemic and remote pandemic teaching after March 2020.

Findings

Teacher Use of Curricular Resources Pre-pandemic

More than half of teachers in Republican states reported using core curricular resources while only about a third of teachers in Democrat states did. The 224 teachers sampled in Republican states ($M = .52$, $SD = .50$) compared to the 167 teachers sampled in Democrat states ($M = .32$, $SD = .47$) were significantly more likely to report they used a core curriculum pre-pandemic, $t(370.128) = 4.163$, $p < .001$.

The teachers from Republican states ($M = .56$, $SD = .50$) compared to the teachers from Democrat states ($M = .43$, $SD = .50$) were significantly more likely to report they used teacher-created curricular resources pre-pandemic, $t(389) = 2.496$, $p = .006$. There was no significant difference between teachers' reported use of supplemental curricular resources in Republican ($M = .47$, $SD = .50$) and Democrat ($M = .41$, $SD = .49$) states pre-pandemic, $t(360.567) = 1.214$, $p = .225$. Overall, the teachers from Republican states ($M = 3.05$, $SD = 1.75$) compared to the teachers from Democratic states ($M = 2.54$, $SD = 1.46$) reported using significantly more curricular resources than their peers pre-pandemic, $t(389) = 3.083$, $p = .001$.

Summary. Teachers from Republican states were using more curricular resources overall, more likely to have a core curriculum, and more likely to find teacher-created curricular resources (e.g., downloading from Teachers Pay Teachers or designing their own) to support student learning in their classrooms. There was no difference in the use of online supplementary resources such as IXL and BrainPop across Republican and Democrat states.

Teacher Use of Curricular Resources During Pandemic Remote Teaching

Although the use of core curricular resources declined during pandemic remote teaching across both Republican and Democrat states, the teachers sampled in Republican states ($M = .44$, $SD = .50$) continued to be significantly more likely to report using core curricular resources compared to teachers sampled in Democrat states ($M = .28$, $SD = .45$) during pandemic remote teaching, $t(374.616) = 3.421$, $p = .001$. There was again no difference between teachers' reported use of supplemental curricular resources in Republican ($M = .43$, $SD = .50$) and Democrat ($M = .43$, $SD = .50$) states during pandemic remote teaching, $t(389) = .473$, $p = .946$. There was also no significant difference between teachers' reported use of teacher-created curricular resources in Republican ($M = .46$, $SD = .50$) and Democrat ($M = .41$, $SD = .50$) states during pandemic remote teaching, $t(389) = .918$, $p = .180$. Overall, during pandemic remote teaching, there was no significant difference between the total number of curricular resources teachers reported using in Republican ($M = 2.79$, $SD = 1.63$) and Democrat ($M = 2.55$, $SD = 1.49$) states, $t(389) = .868$, $p = .193$.

Summary. Despite expectations that teachers may need to find new and varied curricular resources to meet the needs of their students during pandemic remote teaching, the number of curricular resources teachers were using declined in Republican states and remained about the same in Democrat states. The decline in Republican states occurred in core, supplemental, and teacher-created resources, resulting in no state-level differences in any curricular category and no state-level differences in the overall number of resources used in Republican and Democrat states.

Table 2: Total Number of Curricular Resources

State Politics	Time Point	Minimum	Maximum	M	SD
Republican	Pre-Pandemic	0	10	3.05	1.75

Democrat	Pandemic Remote	0	11	2.70	1.63
	Pre-Pandemic	0	7	2.54	1.45
	Pandemic Remote	0	7	2.56	1.49

Teacher Control During Pandemic Remote Teaching

On a scale from 0 (“none at all”) to 3 (“complete”) control, the teachers from Republican states ($M = 1.42$, $SD = .91$) compared to the teachers from Democrat states ($M = 1.15$, $SD = .94$) reported having significantly more control over their curricular resources than their peers, $t(389) = 2.894$, $p = .002$. In fact, the majority of teachers in Republican states (54%) said they had “complete” control over their curricular use. Complete control was much less common in Democrat (27%) states. In contrast, the largest percentage of teachers indicated they had no control in Democrat (41%) as compared to 31% in Republican states.

Table 3: Teacher Control over Curricular Resources in States

Teacher Control	Republican	Democrat
Complete	54%	27%
A lot	48%	29%
A bit	43%	30%
None at all	31%	41%

Student Access to Technology During Pandemic

On a scale from 1 (“25% or less of students had sufficient access to technology”) to 4 (“75% or more of students had sufficient access to technology”) during pandemic remote teaching, 224 teachers from Republican states ($M = 2.92$, $SD = 1.00$) compared to 167 teachers from Democrat states ($M = 3.17$, $SD = .93$) reported having significantly fewer students who had sufficient access to technology, $t(328) = -2.354$, $p = .019$.

Table 4: Student Access to Technology

Sufficient Access to Technology	Republican	Democrat
76% or more	35%	45%
41-75%	33%	34%
26-50%	21%	13%
25% or less	11%	8%

Teacher Preparedness for Pandemic Remote Teaching

On a scale from 1 (“not at all”) to 4 (“completely”) of how well teachers felt prepared for pandemic remote teaching, there was no significant difference between 222 teachers from Republican states ($M = 1.51$, $SD = .65$) compared to 167 teachers from Democrat states ($M = 1.51$, $SD = .65$), $t(360.248) = .500$, $p = 1.00$.

Table 5: Teacher Preparedness

Teacher Preparedness	Republican	Democrat
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Completely	0%	1%
A lot	9%	7%
A bit	33%	36%
Not at all	58%	57%

Discussion

Our pre-pandemic findings support that state-level political differences may be worth exploring in curricular policy. In particular, these findings suggest that teachers in Republican states were more likely to use core curricular resources and more likely to use teacher-created curricular resources. In addition, teachers in Republican states were using more curricular resources than their peers in Democrat states pre-pandemic. There were no significant differences between Republican and Democrat state teachers in terms of supplemental curricular resource usage.

During the initial remote teaching response to the pandemic, the number of resources used by teachers decreased somewhat for both Republican and Democrat state teachers. Although Republican state teachers continued to be significantly more likely to use core curricular resources than their peers in Democrat states, no differences were found between states for supplemental and teacher-created curricular resources and overall, there were no longer any differences in the number of resources used by teachers in Republican and Democrat states.

Limitations in this study included that the data were generated from teacher self-report and that while there was an attempt to secure a sample across states, there were no structures in place to ensure that teachers were sampled equitably across Republican and Democrat political boundaries. Additionally, the timing of the survey (during the first fall semester after the initial onset of the pandemic) may have influenced teachers' time and ability to respond as they were still engaging in rapid instructional shifts due to pandemic policies that differed across state lines.

Educators and policymakers were concerned that teachers had to create new curricular resources when they moved to remote teaching (Huang et al., 2020), but the findings presented here suggest that many teachers were not focused on creating new materials during the initial pandemic push to remote instruction, and instead the findings related to teacher-created curricular resources are consistent with other research (e.g., Aguliera & Nightengale-Lee, 2020; Gross & Opalka, 2020) found that since teachers had to quickly pivot to new teaching models, they focused less on creating new curricular materials during the pandemic. Another potential reason for the decline in the overall number of resources teachers were using and in the likelihood for teachers to use teacher-created resources could be because teachers did not have as much experience creating curricular resources for fully remote/online teaching. Teachers continued use of core curriculum before and during the pandemic in Republican states also support the claim that teachers tended to use ready-made curricular resources instead of investing time in creating new curricular resources while dealing with other challenges.

Research has shown that how rapidly states resumed face-to-face instruction was associated with political interests (Valant, 2021). In addition, the finding that Republican state teachers reported having significantly fewer students who had access to sufficient technology to engage in pandemic remote teaching may have influenced those states' decisions to reopen schools even beyond politics. However, we do not have sufficient evidence if this factor influenced the findings of our study.

There is no doubt that teachers were asked to make rapid instructional changes as schools shut down and remote teaching was instituted across the country. These findings suggest that teachers in Republican states felt like they had more curricular control in responding to emergency shifts. However, there was no difference in how well-prepared teachers in Republican and Democrat states felt to meet the needs of remote instruction, with teachers across the country responding they felt, on average, between “not at all” and “a bit” prepared to take on the challenges. This finding suggests that though teachers may have control over their curricular resources, there may be other barriers that prevent them from taking advantage of their autonomy (e.g., lack of time, preparation, and technological support for online instruction).

As suggested by Dampson and colleagues (2019), how teachers perceive and use their curricular control depends on contextual factors, including the modality of teaching and likely the impacts of the pandemic in their community. As a practical implication, how teachers benefit from and make use of teacher control is largely influenced by external factors, thus, we recommend policymakers consider providing teachers with the opportunities to learn about curricular decision-making and where they can find resources to make those curricular decisions. An additional recommendation may be to ensure that teacher’s voice is included in state legislatures and school board debates about curriculum when enacting policies that impact teachers’ usage of curriculum. Our research team is currently conducting a series of individual and focus-group interviews with teachers to explore how teachers’ curricular decisions are influenced by several factors such as teacher control in less extreme circumstances.

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